STOCHASTIC MODELS OF THE PHASE TRANSITIONS FIRST KIND AT NON EQUILIBRIUM TAGE IN THE MODIFICATION OF SURFACE PROPERTIES

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The work presents computer experiments studies interaction of ions Xe++ gas with ~5-10 keV energy with crystal lattice of thin layers "SiC/metal" substrate and SiC vapors condensation near surface. The both processes are considered as initial stage of phase transition at initial stage. Properties of substrate are altered due to porosity and stresses formation into thin layers substrate. The sizes distribution of sedimented SiC charged droplets with accounting of melt dispergation SiC due to Rayleigh instability is discussed.

Non-equilibrium stage of phase transitions in plasma-like medium (or nucleation of lattice defects as well as droplets of condensation near surface) in nanomaterials as well as their computer modeling are discussed. The solving the kinetic (Kolmogorov- Fokker-Planck and Smolukhovskii) equations in partial derivatives using Ito-Stratonovich stochastic differential equations solution which are equivalent to Kolmogorov equations is presented. Here are concretized: Stochastic kinetic description of the surface properties modification due to phase transition first kind at non equilibrium (fluctuation) stage which is related with the models of creation microdefects, their the Gibbs free energy as well as with the Brownian motion in the potentials of indirect long-range interaction between gaseous bubbles into lattice. These models predict stress from gas bubbles penetration and the alteration substrate properties[2]. Also we are carried out the computer simulation of silicon carbide (SiC) vapors condensation in a plasma discharge and the formation of thin film islands on a Si(100) substrate. Earlier the dusty plasma dynamics [3] had been studied in 3D3V kinetic plasma code[4], here is presented processes of charged particles nano sizes condensation (such as «from vapors to melt droplets») under cooling process.

Acknowledgements

Author is grateful to T.A. Averina for base of mathematical aspects of model. This work is partially supported by grants RFBR 15-01-05052 and by the Department of Mathematics of the RAS №3(3.6).

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